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ABSTRACT

The Internet has major implications for both education and educational research. According to John Dewey (1916), the form of experience that is most educative is participation in shared inquiry. The Internet "represents a dynamically evolving virtual world, with virtual communities forming all over the place, each composed of people with similar interests but diverse locations" (Cunningham, 1996). Most universities and schools of education are now connected to the World Wide Web. This paper presents an overview of the Internet as a tool for educational research, and explores some of the issues raised for the academic community of the move from traditional to information technology-assisted information skills, collaboration on research projects, materials available for research on the Internet, and the interchange of ideas within the new intellectual community that exists on the Internet. In order for technology to have a substantial impact on educational research, a number of issues need to be addressed: equitable access to Internet-connections, anywhere and anytime; universal access to computers needed to access the Internet; worthwhile, quality web-sites to explore; development of the necessary information retrieval skills among both faculty, staff, and research students; and an understanding of how the tools of the communication age can be used to build the future, and not simply reproduce the past. (Contains 30 references.) (Author/SWC)

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Title: Educational research and the Internet

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Abstract
The use of the Internet has grown exponentially, and is thought currently to have 40 million users. The Internet has major implications for both education and educational research. According to Dewey (1916) the form of experience that is most educative is participation in shared inquiry. The Internet is, arguably, one of the greatest resources ever invented for fostering growth as it 'represents a dynamically evolving virtual world, with virtual communities forming all over the place, each composed of people with similar interests but diverse locations' (Cunningham, 1996: 3). Since most universities, and Schools of Education are now on the World Wide Web this paper presents an overview, and also explores some of the issues raised for the academic community of the move from traditional to Information Technology-assisted information skills, collaboration on research projects, materials available for research on the Internet, and the interchange of ideas within a new intellectual community present on the Internet .

Strand: New information technologies in education
Key words: information technology, Internet, information skills, community

Bio-data

Azam MASHHADI's doctoral thesis was on *What is the nature of the understanding of the concept of 'wave-particle duality' among Advanced level Physics students?* at the University of Oxford. Following degrees in Physics *(University of London)* and Astronomy *(University of Sussex)* he taught for several years at a college in London (UK) before completing a M Sc in Educational Research Methodology *(Oxford)*. His research interests include student learning, teacher education, the use of IT in education, research methodology, and philosophy of science.

Christine HAN's doctoral thesis was on *Education for Citizenship in A Plural Society* at the University of Oxford. Following a first degree in Philosophy *(National University of Singapore)* she was awarded the Nanyang Technological University Oversea Graduate Merit Scholarship to pursue research in the philosophy of education. As part of the M Sc in Educational Research Methodology *(Oxford)* she wrote a dissertation on the education of the emotions. Her research interests include topics in the philosophy of education, moral education, citizenship education, philosophy for children, and the implications of the Internet for educational research. She is currently attached to the National Institute of Education (Nanyang Technological University, Singapore).

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1 Introduction

The use of the Internet has grown exponentially, and is thought currently to have 40 million users world wide. The Internet has major implications for both education and educational research (Bates, 1996). Since most universities, and Schools of Education are now on the World Wide Web there are a number of issues raised for the academic community with regard to the move from traditional to Information Technology-assisted information skills, collaboration on research projects, materials available for research on the Internet, and the interchange of ideas within a 'new' intellectual community present on the Internet (Chronaki and Bourdakis, 1996).

2 The Internet

The Internet is the public 'network of networks' which spans the world and can be accessed through dial-up connections or direct high-speed business links. Hert (1994: 40) points out that a number of conceptual schemes or metaphors abound for the Internet:

1. Internet as superhighway (the high-speed network backbone) with feeder routes (smaller networks)
2. Internet as geographic space or cyberspace
3. Internet as a socially constructed space such as a city
4. Internet as mine
5. Internet as ecosystem

The Internet carries several kinds of services but for most users today it means two things: the World Wide Web and a universal channel for e-mail (Monahan and Dharm, 1995). The World Wide Web is the point-and-click Internet interface run through browser software, such as Netscape or Mosaic, which is expected to become the standard way of organising and finding information, both on the public Internet and on private intranets. An intranet is a private internal network based around World Wide Web technology but closed to the outside world. In the future, most organisations are expected to use an intranet as the core for their IT structure, running data-processing activities through web pages that tie into older systems, possibly on mainframe computers. For instance, since intranet and Internet technology is effectively the same, institutions will be able to amend an existing paper prospectus and turn it quickly into an online prospectus.

The Web makes use of Uniform Resource Locators (URLs) to identify resources, often documents. The operation of the Web relies mainly on hypermedia structures as a way of navigation for users. This is done by anchoring links to other resources through the use of the HyperText Markup Language (HTML). Any resource can be linked by reference to any other.

The World Wide Web is an Internet-based hypermedia initiative for global information sharing, and is the incarnation of the concept of cyberspace. The author William Gibson in his futuristic novel *Neuromancer* invented the term 'cyberspace' to describe his vision of a global computer network, linking people, machines, and sources of information in a world through which one could navigate as through a virtual space:

> Cyberspace. A consensual hallucination experienced daily by billions of legitimate operators, in every nation, by children being taught mathematical concepts... A graphic representation of data abstracted from the banks of every computer in the human system. Unthinkable complexity. Lines of light ranged in the nonspace of the mind, clusters and constellations of data. Like city lights receding...
> Gibson (1986: 49)

One interpretation of what is meant by the term 'cyberspace' is that it involves the annihilation of space. Marshall McLuhan (1964: 5) in the 1960s argued that:

> As electrically contracted the globe is no more than a village. After three thousand years of explosion, by means of fragmentary and mechanical technologies, the Western world is imploding. During the mechanical ages we had extended our bodies in space. Today, after more than a century of electric technology, we have extended our central nervous system itself in a global embrace, abolishing both space and time as far as our planet is concerned.

Cyberspace can be viewed, arguably, as the latest stage in the evolution of Karl Popper's World 3 (Magee, 1973) - the world of objective, real, and public structures. In wandering in the multidimensional virtual world of cyberspace people are navigating through a 'common mental geography'.

3 Community of inquiry

The information and communications revolutions that have resulted in the Internet have built a means of information exchange which has 'annihilated' distance and time, and accelerated the process of creating a global community of inquiry (Thornburg, 1994; Silvio, 1995).

According to John Dewey (1916) the form of experience that is most educative is participation in shared inquiry. The Internet is, arguably, one of the greatest resources ever invented for fostering growth as it 'represents a dynamically evolving virtual world, with virtual communities forming all over the place, each composed of people with similar interests but diverse locations' (Cunningham, 1996: 3).

The impact of the new technologies is to enable the process of communication and collaboration between institutions and individuals to be accelerated. However, the goal of arriving at the goal of a community of educators, in any true sense, can only be brought about if there is the freedom to do so.

There needs to be negative freedom in terms of a free market of ideas which involves, among other things, a lack of restraint on the choice of topics in public discussion, and the views which may be expressed. There needs also to be a positive freedom in terms of the availability of information, and the ability to think for oneself and to articulate one's views. Apart from acquiring the appropriate knowledge and skills, members of such a community have to have the requisite procedural values - and, by implication, substantive values - according to which public debate is to be conducted.

If, as has been suggested, the Internet has accelerated the process of creating a global community of inquiry, the question arises as to what is meant by a 'community of inquiry'. For Matthew Lipman (1991: 15), it is one in which people:

> ... listen to one another with respect, build on one another's ideas, challenge one another to supply reasons for otherwise unsupported opinions, assist each other in drawing inferences from what has been said, and seek to identify one another's assumptions.

For Lipman, the aim of a community of inquiry is to generate a '*product*, ...(which is) some kind of settlement or judgement, however partial and tentative this may be' (original emphasis) (Lipman, 1991:229). Entering into such an inquiry is to follow, as a community, the argument where it leads. In so doing, it is hoped that individuals would acquire and develop cognitive skills (e.g. identifying assumptions, making generalisations, and finding examples), and practise the use of cognitive tools (e.g. reasons, criteria, concepts, rules and principles). The process of communal reasoning also offers opportunity for people to build on each other's ideas and suggest counter-examples or alternative hypotheses (Lipman, 1991:229-243).

In his notion of a community of educated people, Richard Pring (1995: 126) too emphasises how - by thinking and reflecting in a group, and exposing one's ideas to scrutiny - one's ideas are refined and one's efforts are supported. The practice of thinking and deliberating in concert with others also makes possible greater confidence in the provisional conclusions that are arrived at.

Hence, members of a community of inquiry can engage in the process of thinking and exploring ideas and, in so doing, benefit from each other's contributions. They may also have a greater, if tentative, certitude in terms of conclusions made. There is also the idea that an essential part of the process is the learning, and implementation, of the value of respect for others.

It could be said that members of a community of inquiry, like those of a nation, would share the same culture, or a 'system of ideas and signs and associations and ways of behaving and communicating' (Gellner, 1983:7). Similarly, just as there is a recognition of mutual rights and duties among members of a nation, members of a community of inquiry would share certain values and understandings.

A reason for the difficulty in forming a community of inquiry could be the competitive ethos which could result in an unwillingness to share one's knowledge or ideas with one's peers lest one 'loses out' to them. However, for a community of inquiry, it is necessary for individuals to jointly engage in articulating their understandings. It is necessary also to accept the idea that others might have their legitimate albeit different judgements, so that tolerance is possible. Only then will there be a genuine respect for the views and contributions of one's peers, and the willingness to tolerate others and work with them to achieve some form of common understanding.

The institutionalisation of of education, and research on education, over past centuries has been crucial to the original development of expertise and professionalism. The development of the Internet is leading to an acceleration, and an enabling of the process exchanging and pooling of information and resources. Institutions and individuals are increasingly becoming 'partners in research and learning'. Clark (1996: 131) argues for partnership as being a communal concept, and defines it as:

> A sense of community created across social systems.

For partnerships to come into being, there needs to be the process of networking. Networks are not new, there have been social ones since the dawn of society. As Woolley (1992: 125) points out:

> What is new is the technology of communication that has enabled information of any type to be carried from one place to another regardless of their distance.

What is meant by 'networks' is not easy to define. Alter and Hage (1993: 46), for instance, propose a number of definitions:

> Networks constitute the basic social form that permits inter-organisational interactions of exchange, concerted action, and joint production. Networks are unbounded or bounded clusters of organisations that, by definition, are non-hierarchical collectives of legally separate units.
>
> Networking is the art of creating and/or maintaining a cluster of organisations for the purpose of exchanging, acting, or producing among the member organisations.

Clark (1996: 142), in addition points out that:

> ...networks also embrace individuals, and that networks are more informal (unbounded) than formal (bounded).

4 Educational research

The full impact of the Internet on the research community is only beginning to be realised. Peter Young (1991: 1) suggests that:

> There is evidence that a restructuring of the knowledge communications infrastructure [as a result of electronic information] will have a fundamental impact on our educational, research, and informational institutions. It is affecting the communication customs, habits, and expectations of scholars, scientists, researchers, and academic librarians. In effect, the changes are affecting the entire information transfer cycle from the creation, structuring, and representation of information to its dissemination and use by the members of our collegial knowledge communities.

Electronic or e-mail is probably the first Internet resource that researchers come across, and has revolutionised communication processes by allowing users to receive and transmit information from virtually anywhere in the world almost instantly and at relatively low cost. Sproull (1986: 159) lists four characteristics of e-mail that make it such a powerful tool:

> (1) *Speed* - messages can be transmitted in seconds to any location in the world...
> (2) *Asynchronous Communication* - messages can be sent, read, and replied to at the convenience of the user.
> (3) *No Intermediaries* - Email messages are generally only read by the receiver.
> (4) *Ephemerality* - Email messages appear on screen and can easily be deleted with no trace of a hard copy.

Apart from enhancing contacts between individuals and groups e-mail has been used in a variety of ways. The growth of online networks around the world, and increased access by individuals and institutions, for instance, has seen an increase in the use of e-mail survey research, i.e. the systematic data collection of information on a specific topic using computer questionnaires delivered to an online sample population. Thach (1995: 30) points out that there are many advantages to e-mail survey research over traditional paper questionnaires, but also some disadvantages:

> Some drawbacks include the sample demographic limitations, lower levels of confidentiality, additional orientation/instructions, layout and presentation issues, and potential technical problems with hardware and software. Advantages include cost-savings, ease of editing/analysis, faster transmission time, easy use of preletters (invitations), and the three major response findings: (1) higher response rates, (2) more candid responses, and (3) potentially quicker response time with wider magnitude of coverage.

After people discover e-mail, it is common for them to enter into the world of listservs or specialist discussions groups (see Pierce *et al.*, 1995; Pierce *et al.*, 1991). Pierce *et al.* (1994: 25) in discussing the use of electronic listservs and discussion groups quoted one subscriber who explained why he engaged in computer networking:

> I stumbled across a call for papers from someone who had proposed an invited symposium and needed a couple more presenters. Got a presentation and a trip to a conference that I didn't even know about before. I have had the opportunity to be a "peer reviewer" and a

> semiregular article reviewer for a journal by answering similar pleas for help from busy editors. On numerous occasions I have conducted "grapevine searches" on various e-mail lists to supplement my library-based literature searches. I've located interesting material in addition to meeting "kindred spirits" with similar research interests.

The development of electronic discussion lists and Web technology has resulted in the development of electronic journals. As Pierce *et al.* (1994: 27) point out the electronic journal can have a number of advantages over paper journals:

> The advantages of electronic distribution include reduced publication time, increased access, and potentially reduced costs. The contents can be searched with many word processors. Furthermore, with the on-line discussion capabilities of the network,greater peer review, comment, and interaction are possible in a timely manner. Innovative forms of peer review and feedback/exchange with the author would be possible (e.g., attached to each article could be the reviews of any reader wishing to comment, or a list of rebuttal comments, questions and responses by the author).

Electronic journals, of course, by their very ease of use raise questions of copyright protection, and the facilitation of plagiarism.

Kriz (1995: 1) comments on publishing on the Web:

> The World Wide Web (WWW) is emerging as an elegant and usuable method for distributing information via computer networks. WWW uses interlinked hypertext documents to find and display multimedia information, including text, color graphics, video and audio. The Web can be used to distribute information within a company or university, to a small group of students in a particular class, or to the entire world. The means for doing this are now available to anyone with a desktop computer connected to a network.

The ease of publication is enhanced by software being freely avaliable on the Internet, as is Web documentation and tutorials on creating hypertext multimedia documents (see Kriz, 1995; Forsyth, 1996).

The sheer quantity of information available in cyberspace does raise the question of separating the Internet wheat from the chaff. As Maddux (1994: 41) expresses it:

> This is a serious problem that is partly controlled in traditional print media by a combination of academic and technical requirements. Journals subject articles to peer review, and the limited number of pages that can be included in any publication ensures that at least some controls over the quality of content have been applied before someone was willing to risk the capital to produce the publication.
>
> However, thses requirements are minimal or nonexistent on the Internet. Although peer-refereed electronic journals do exist, the vast majority of information on the Internet has not been subjected to such review. Then, too, there is often no cost directly to individuals who post information in various places.

Electronic networking is, consequently, also redefining conventional patterns of research. For instance, documents that had previously been stored in physical form are now retrievable by a number of users simultaneously and kept in cyberspace. The introduction of information technology does not, however, ensure its effective use. Teaching research students (and faculty staff) to use such new tools as networked computers and on-line databases is as essential today as were the skills of typing or

using a card catalogue in a previous era (Barry, 1996; Levy *et al.*, 1996). As Kawamoto (1994: 48) points out:

> If the vast amounts of information available on electronic databases lend themselves more to the metaphor of having to navigate through an ocean than a superhighway, computer-assisted research training is not ultimately concerned with what to fish, but rather *how* to fish.

One of the most exciting aspects of this communication revolution is how it facilitates collaboration or partnerships between researchers, not just within the same organisation but particularly across geographical boundaries (see Gaines and Shaw, 1996). A new research project, for instance, currently being set up involves school students in England and Australia accessing a web-site, and trying out the same mathematical problems. The students will be videotaped in order to investigate their problem-solving strategies. Video-clips , and the analysis will be added to the web-site for comments by other researchers (initially from Canada, the USA, and Singapore). The students will also be able to access the web-site and comment on the problems.

5 Conclusion

In order for technology to have the impact on educational research that it, arguably, should have a number of issues need to be addressed:

1. Equitable access to the on-ramps leading to the information highway (i.e. anywhere, anytime access to the Internet).
2. Universal access to the computers needed to travel on the information highway.
3. Worthwhile places or web-sites to explore (i.e there are an enormous number of web-sites, but quantity does not necessarily assure quality).
4. Developing the necessary information retrieval skills among both faculty staff and research students.
5. Understanding how the tools of the communication age can be used to build the future, and not simply reproduce the past.

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